LIST OF MATERIALS, SUPPLIES, AND EQUIPMENT FOR TEACHER ASSESSMENTS (ADVANCED)

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The materials, supplies and equipment are listed for all jobs for each performance test. Each evaluator will need to determine the quantity of items required depending on the number of testing stations and test participants to be tested at one time unless it is specifically stated otherwise.

WRITTEN ASSESSMENTS

ALL WRITTEN ASSESSMENTS

- Non-programmable calculator, when appropriate
- Scrap paper
- No. 2 pencils

BUILDING CONSTRUCTION OCCUPATIONS (5163)

- 2007 National Electrical Code

ELECTRICAL CONSTRUCTION TECHNOLOGY (5171)

- 1999 National Electrical Code

PRECISION MACHINING (5176)

- Machinery's Handbook

PERFORMANCE ASSESSMENTS

ADMINISTRATIVE ASSISTING (5160)

Computer with word processing and spreadsheet software
Printer
Pen and pencil
CD or Diskette (or equivalent)
Blank paper (8 1/2 x 11)
Business/legal sized envelopes
Dictionary
Office reference manual
1 File folder
Copy holder (optional)
Adjustable chair

ADVERTISING AND DESIGN (5161)

JOB 1
Computer with page layout and drawing software (such as, QuarkXPress, Freehand, Illustrator, InDesign, or Corel Draw)
11" x 17" white printer paper
Digital image (theme appropriate for a travel flyer)
Sun graphic

JOB 2
Computer and drawing software (such as, QuarkXPress, Freehand, Illustrator, InDesign, or Corel Draw)
Color printer
Conventional layout materials (markers, colored pencils, tracing paper, masking tape)
Triangles
T-Square or straight edge
Rulers
Type sample books or computer font books
11" x 17" illustration board
11" x 19" flap paper (cover sheet)
Rubber cement

AUTOMOTIVE TECHNICIAN (5162)

JOB 1

40 tags or stickers to use as labels for the following parts:
Valve guide seal
Valve lifter (hydraulic roller-type)
Piston wrist pin
Timing belt
Oil control ring
Valve body assembly
Front pump assembly
Sprag clutch
Friction disc
Friction band
Shift fork
Clutch disc
Synchronizer ring
CV joint
Input shaft
Tie rod end
Strut assembly
Sway bar link
Power steering pump
High pressure hose
Proportioning valve
Caliper
Wheel speed sensor
Master cylinder
Star wheel brake adjuster
Circuit breaker
Fusible link
Rectifier diode
Relay
Starter solenoid
Accumulator
Orifice tube
Clutch cycling switch
Clutch assembly
Thermostat
Ignition coil, individual cylinder (coil on plug)
Idle air bypass valve
Throttle position sensor
Mass air flow unit
O_2 sensor

JOB 2

Front wheel drive vehicle with hubless rotor disc brake assembly
Socket set, 3/8" drive
Torque wrench and sockets
Rotor specification book
Rotor micrometer
Brake lathe
Hubless rotor to machine

JOB 3

Steel wheel, 14" or 15"
Tires, two (2) 14" or 15" to match rim size
Tire changing machine
Tire pressure gauge
Tire bead lubrication with applicator
Valve core removal tool
Electronic tire balance machine
Assorted clip-on wheel weights
Wheel weight hammer and pliers
Extra valve stems and cores (as needed)

JOB 4

Identified cylinder head with an exhaust valve removed and retained
Specification book corresponding to identified cylinder head
Straightedge
Feeler gauge set (metric and English marked)
Micrometers (0 to 1 inch and 0 to 25 mm)

JOB 5

Vehicle with electronic fuel injection, service port, and fuel pressure regulator
Fuel pressure gauge with adaptors
Fuel container
Fire extinguisher
Specification book
Vacuum hand pump with vacuum line plugs

JOB 6

Vehicle with operating washer pump that has an open ground circuit
Service manual for the vehicle used
12-volt test light
DVOM
Fused jumper wire
Spare fuses
Hand tools to access washer pump (as needed)

AUTOMOTIVE TECHNICIAN (5162)(continued)

JOB 7

Test vehicle with correctly functioning battery, starting, and charging system
Volt-amp tester
Tachometer
Specification book
DVOM

JOB 8

Vehicle equipped with electronic fuel injection system **(vehicle must have two "bugged" sensors)**
"Bugged" sensors must match fault codes set in the PCM
Manufacturer's service manual
Scan tool

BUILDING CONSTRUCTION OCCUPATIONS (5163)

JOB 1
2’ of 1/2’’ copper tubing
2 – 1/2’’ 90-degree elbows (copper)
2’ of 1/2’’ iron pipe
Solder
Flux
Emery cloth
Steel wool/sandpaper
Fitting brush
Pipe cutter
Pipe dies
Tubing cutter
Pipe vise
Plumber’s torch
Cutting oil
Measuring tape
Flux brush

JOB 2
1 - 2 x 6 x 8
Framing square
Measuring tape
Stair gauges
Sawhorses
Pencil

JOB 3
1 - 2 x 12 x 8
Framing square
Measuring tape
Stair gauges
Sawhorses
Pencil

JOB 4
Studded or framed workstation
2 – Single-pole switches
3 – Non-metallic device boxes
2 - Duplex receptacles
2 – Split receptacles
2 – Three-way switches
12’ – 14/2 cable
12’ – 14/3 cable
10 – Yellow wire nuts
10 – Red wire nuts
20 – Cable staples
Lineman pliers
Long-nosed pliers
Hammer
Flathead screwdriver
Philips screwdriver
Knife
Measuring tape
Wire strippers
Diagonal cutters
Tester
Pencil

JOB 5
4 - Corner (jamb) blocks
2 - Half corner (jamb) blocks
4 - Line (stretcher) blocks
Mortar
Concave jointer
Measuring tape
Mason’s brush
Levels, 2’ and 4’
Mortar board
Trowel
Chalkline
Pencil

BUILDING TRADES MAINTENANCE (5164)

NOTE: Successful completion of Jobs 2-6 requires a completed frame built in Job 1. Provide a completed frame, based on the instructions and specifications in Job 1, for use by any participant who is unable to complete Job 1.

JOB 1
Structural lumber, two pieces 2" x 4" x 8' long
Common nails, ten 16d
Common nails, four 8d
Workbench (or table)
Hammer
Circular saw
Tape measure
Framing square
Hand saw
Clamps to secure project to table
Pencil

JOB 2
CU caps, 1/2"
MIP fitting, 1/2"
Tee, 1/2"
45º Els, 1/2"
Copper straps, 1/2"
Four feet of CU pipe, 1/2"
Dry wall nails
Quick connect coupling, 1/2"
Emery cloth
Flux
Lead-free solder
Propane torch
Striker
Flux brush
Tape measure
Tubing cutter
Power drill
Spade bit, 5/8"
Hammer
Extension cord
Rags
Wire brush, 1/2", fitting
Teflon tape (or joint compound)
Pencil

JOB 3
Device box (plastic)
Octagon box (metal) with connector and strap or bracket
Nonmetallic (Romex) staples
14/2 Nonmetallic cable with ground, 5'
Roofing nails

JOB 3 (continued)
Grounding screw
Yellow wire nuts
Hammer
Cable stripper (or utility knife)
Wire stripper
Lineman's pliers
Multipurpose screwdriver
Pencil

JOB 4
1 pc. 1/2" Drywall (2' x 2')
2' Paper tape
Drywall nails
Joint compound
Hammer
Keyhole saw
Power drill
5/8 spade bit
Utility knife
Framing square
Tape measure
Pencil
4" Taping knife
Hawk (or tray)

JOB 5
Single-pole switch, with ground
Porcelain keyless light fixture
Light bulb, 40 watt
Switch plate cover
Multipurpose screwdriver
Needlenose pliers
Multipurpose tool (or wire stripper)
Continuity tester

JOB 6

Butt hinge (square), 4"
Matching screws
Chisel, 3/4"
Hammer
Pencil
Tape Measure
Awl
Multipurpose screwdriver

CARPENTRY (5165)

Participants are allowed to use a non-programmable calculator during this performance assessment.

JOB 1

Handsaws: back, coping, crosscut, hack
Bits: speed, auger, masonry, twist
Circular saw blades: combination, crosscut, dado, abrasive
Wrenches: adjustable, Allen, box, open end
Nails: roofing, duplex, framing (sinker or box), finish
Fasteners: flathead screw, lag bolt, drywall screw, carriage bolt
Lumber scraps: fir, cedar, white pine, oak
Finishing tools: wood chisel, block plane, half-round file, nail set
Layout tools: combination square, framing square, speed square, sliding T-bevel
Marking tools: scratch awl, compass scribe, carpenter's pencil, chalk box
Set of adhesive labels (40) for above items

JOB 2

Appropriate personal protection equipment
Safety glasses
4 concrete blocks 8 inch x 8 inch x 16 inch
Tape measure, at least 25 feet (one for each workstation)
Chalk box (including blue chalk)
2 inch masking tape (may be used to mark corners of square)
Pencils
Broom to sweep away chalk lines between participants

JOB 3

Appropriate personal protection equipment
Safety glasses
Bracing materials (for set-up)
Builder's level with sight rod
Material for benchmark references, i.e. 4 inch x 4 inch, ledger on wall, concrete block, 2 feet x 4 feet wall panel or equivalent, etc.

JOB 4

Appropriate personal protection equipment
1 piece of lumber: 2 inch x 4 inch x 16 feet (species does not matter)
Adding machine paper, 3 1/2 inch x 16 feet, per participant

JOB 4 (continued)

1 inch masking tape or stapler with staples
Tape measure, at least 25 feet
Pencils

JOB 5

Appropriate personal protection equipment
1 piece of lumber: 2 inch x 6 inch x 8 feet (species does not matter)
Roll of paper, 5 1/2 inch x 8 feet, per participant
Rafter framing square or speed square with accompanying book
Stair gauges/Square clips
Staples or masking tape
Pencils

JOB 6

Appropriate personal protection equipment
1 piece of lumber: 2 inch x 12 inch x 48 inch (species does not matter)
Roll of paper, 11 1/4 inch x 4 feet, per participant
Framing square
Stair gauges
Staples or masking tape
Tape measure
Pencils

JOB 7

Appropriate personal protection equipment
Bracing materials (for set-up)
Rough opening should be 1/2 inch larger than the frame size on all sides
1 frame, (approximately 2 feet x 3 feet) assembled
1 piece casing molding, 6 feet to 8 feet
Level (2-foot and/or 4-foot)
Framing square
Miter box (power or manual)
Block plane
16 oz. hammer
Handsaws, 8 and 10 pt.
Utility knife with blade
Finish nails, 4d, 6d, and 8d
Nail set
Wood shims
8d double head nails or 2 inch drywall screws (optional for frame installation only)
Pencils

COLLISION REPAIR AND REFINISHING TECHNOLOGY (5166)

Provide the technical information manuals that accompany paint products.

JOB 1
MIG/GMAW welder, prepared to weld test coupons
1 1/2" x 3" minimum steel test coupons; minimum 21 per participant
(At least 3 of the test coupons must have 5/16" holes for plug welding)
Clamps/vise grips
Anti-spatter compound
Welding screen, as needed
Side cutters
MIG welding helmet
Welding gloves
Welding jackets or long sleeves
Safety glasses

JOB 2
Body panel
Wax and grease remover
Air gun/blow gun
Shop towels
Table or stand for panel
Ball peen hammer (to put a dent in the fender)
Assorted hammers and dollies
Extension cord
Grinder (24 to 50 grit)
Dual action sander
Body filler
Glazing putty
Mixing board
Spreader
Cheese grater
Sanding block (assorted sandpaper)
Hand board (assorted sandpaper)
Metal file
Slapper or slapping spoon (optional)
Uni-spotter (optional)
Safety glasses
Particle mask
Chemical resistant gloves

JOB 3
1996 or newer vehicle
Tram gauge
Pencils
Scrap paper
Safety glasses
Non-programmable calculator

JOB 4
One ready-to-paint panel
HVLP spray gun(s)
Appropriate tip(s) for spray gun(s)
Final prep or pre-paint cleaner
Base coat paint
Blow gun
Reducers
Hardeners
Clearcoat
Tack rags
Disposable towels
Paint mixing area
Paint spray booth
Assorted sandpaper
Stand to hold panels in vertical position
Fresh air supply system with eye protection
Chemical resistant gloves

JOB 5
Paint masking machine
Wax and grease remover
Disposable towels
Masking tape (various sizes)
Foam tape (optional)
Masking paper (various sizes)
Lifting tape (optional)
Safety glasses
Chemical resistant gloves
Wheel covers
Razor blades (optional)

COMMERCIAL FOODS (5167)

JOB 1

1. zester
2. channel knife
3. Parisian scoop/melon baller
4. mandolin
5. offset spatula
6. clam knife
7. meat mallet/tenderizer
8. silpat or parchment paper
9. china cap
10. pastry cutter or wheel
11. skimmer
12. cheesecloth
13. fillet knife
14. bench scraper
15. food mill
16. basil
17. cilantro
18. rosemary*
19. thyme*
20. sage
21. coriander
22. nutmeg (whole or ground)
23. cayenne pepper
24. sea salt*
25. curry
26. cider vinegar*
27. pepper corns (any type)
28. soy sauce – reduced sodium*
29. corn syrup (dark or light)
30. sesame seeds*

Items marked with an asterisk (*) may be reserved to use again in JOB 3.

NOTE: Herbs, spices, and flavorings may be fresh, dried, or ground.

Appropriate substitutions *of comparable difficulty* may be made if necessary, but the number of items on display should not change.

If tools or food items are not available, you may use clear visual images of these items (i.e. photographs)

JOB 2

Assorted knives for cutting vegetables
Sharpening stone
Sharpening steel
Cutting board

The following will be prepared in Job 2, and then reserved for Job 3:
Onion, 1
Garlic Cloves, 3
Celery, 1 rib
Parsley, 1/4 bunch
Carrot, 1 large
Red Bell Pepper, 1/2
Green Bell Pepper, ½
Fresh ginger, 1 small
Scallion, 1
Fresh herbs, assorted mixed, 2 ounces

COMMERCIAL FOODS (5167) continued

JOB 3 (per participant)

Chicken (1/2 chicken, bone-in)
Chicken Stock, 2-3 cups
Rice – 1/2 cup long, white
White Bread, 2 slices
Flour, all purpose
Granulated sugar, ¼ tsp
Vegetable Oil, 8 ounces
Peanut or sesame oil, 3 tbsp
Butter or margarine, 8 ounces
Buttermilk, 1/2 cup
Heavy cream – ¼ cup
Cheddar Cheese, Shredded, 1/4 cup
Lemon Juice, 2 teaspoons
*Oyster Sauce, 3 tablespoons
*Sweet & Sour Sauce, 3 tablespoons
Soy Sauce, reduced sodium, 1 tablespoon
Cider Vinegar, 1 ounce
Dijon Mustard, 1 teaspoon
Sea Salt
Table salt
Pepper (black and white)
Garlic, fresh
Rosemary, fresh
Thyme, fresh
Sesame Seeds
Fresh Herbs, assorted mixed, 2 ounces
Parsley, fresh, 1/4 bunch
Salad Greens, mixed, 4 ounces (prewashed)
Red Bell Pepper, 1/2
Green Bell Pepper, 1/2
Celery, 1 rib
Onion, 1
Onion powder (pinch)
Garlic powder (pinch)
Granulated garlic ¼ tsp
Baking powder – 2 tsp
Carrot, 1 large
Snow Peas, 2 ounces (may substitute broccoli)

***NOTE:** Depending on availability and choice, either Oyster Sauce or Sweet & Sour Sauce may be used in the Stir-Fry Recipe in Job 3.

ADDITIONAL EQUIPMENT NEEDED

Scale
Range top
Food storage containers (10)
Assortment of knives (i.e., 1 chef, 1 paring, etc)
Assorted sauté pans
Baking sheet pan
Assorted pots and pans (i.e., 1 – 2 qt. sauce pan with lid)
Appropriate pan/pot covers
Service plates (2 salad plates, 4 dinner plates, etc)
Colander
Vegetable peeler
Spatulas
Cutting board with mat
Oven
Oven mitts
Plastic gloves
Wire whisk
Knife steel
Small stainless steel bowl
Tongs
Measuring cups
Measuring spoons
Towels
3-compartment sink
Tasting spoons
Sanitizing buckets
Sanitizing solution
Rolling pin (optional)
Service plates (2 each course)
Round biscuit cutter
Pocket Thermometer
Pencils

COMPUTER TECHNOLOGY (5168)

JOB 1

Personal computer running Windows 2000 or newer
Wordpad software
Four floppy diskettes **or** one Flash Drive per participant)
The same Flash Drive will be used for Job 1, Job 2, and Job 3
The same floppy diskettes will be used for Job 1, Job 2, and Job 3
Printer access
Printer paper
Writing utensils

JOB 2

Personal computer running Windows 2000 or newer
Word processing software including Spellcheck and Thesaurus
The **DATA2** floppy diskette (from Job 1) **or** the Flash Drive from Job 1
Printer access
Printer paper
Writing utensils

JOB 3

Personal computer running Windows 2000 or newer
Spreadsheet software
The **DATA3** floppy diskette (from Job 1) **or** the Flash Drive from Jobs 1 and 2
Printer access
Printer paper
Writing utensils

JOB 4

Personal computer running Windows 2000 or newer
DNS or DHCP server
Network connectivity
Proxy server address and port
Identify a specified Internet website, such as www.refdesk.com
Specified server address
Writing utensils

CRIMINAL JUSTICE (5169)

JOB 1

Tape to secure the area
Latent fingerprint equipment (black powder and white lifters)
Note pad and pen
Measuring tool (at least 25 feet)
Gloves
Evidence packaging (paper and plastic)
Tags
Marking tools
Three (3) different items of evidence:

a) 1 cloth item with wet evidence
b) 1 additional piece of evidence
c) 1 glass item with a fingerprint on it

JOB 2

Handcuffs and key
"Suspect" role player *(must be same gender as the participant)*
Contraband to hide on the subject (2 pieces)
(Hide contraband in outside clothing, socks or shoes only)
Fingerprint cards
Fingerprint rolling equipment
Clean-up equipment
Pen

JOB 3

Adult size CPR mannequin
Pocket mask for CPR
Exam gloves

DIESEL TECHNOLOGY (5170)

JOB 1

4-cycle diesel engine with appropriate valve cover removed
Safety glasses
Service manual for engine used
Socket and breaker bar to turn engine
Dial indicator set
Thickness/feeler gauge set
Wrenches
Screwdrivers
Torque wrench
Shop towels
Pencils and scratch paper

JOB 2

Diesel engine with wet sleeve-type cylinders with one cylinder head removed
Safety glasses
Service manual for engine used
Dial sled gauge
Clamping fixtures for cylinder liner
Appropriate liner installation tool
Appropriate liner puller
Depth micrometer, appropriate for engine
Hammer
Outside micrometer, appropriate for engine
Torque wrench
Shop towels
Pencils and scratch paper
Breaker bar or ratchet
Required sockets

JOB 3

Engine in operating condition including complete starting/charging system (engine may be in or out of vehicle)
Safety glasses
Rubber apron (optional)
Rubber gloves
First-aid kit
Eye wash station
Manufacturer specifications and/or service manual
Battery tester manual
Batteries, reduced maintenance, 12 volt – capable of holding a charge
Battery load tester **(carbon pile type)** with voltmeter and inductive pick-up ammeter
DVOM
Shop towels
Pencils and scratch paper

JOB 4

Diesel engine, water cooled, with operable cooling system
Safety glasses
Radiator pressure test kit including cap test adapters
SCA test strips that measure Nitrate level
Coolant refractometer
Bulb syringe
Plastic container, clean
Coolant additive chart
Shop towels
Pencils and scratch paper

JOB 5

Axle end with a 2-nut (double nut, jam nut, lock nut) bearing adjustment system ("jam nut" and lock removed, adjusting nut loosened)
Safety glasses
Calculator (non-programmable)
Tape measure – retractable
Torque wrench with proper torque range
Brake pedal bar
Air supply, 90 psi
Wheel nut sockets, appropriate
Dial indicator
3/4-inch drive ratchet or breaker bar
Shop towels
Pencils and scratch paper

IF ENGINES USED ARE "IN VEHICLES", THE VEHICLES MUST BE BLOCKED AND CHOCKED.

ELECTRICAL CONSTRUCTION TECHNOLOGY (5171)

Material List

15 AMP GFCI receptacle and cover plate
Two 3-way switches and cover plates
Keyless lamp holder
Light bulb for Type-A lamp
Doorbell chime kit (transformer suitable for lock mount, single pole normally open-momentary closed door bell push button, door bell chime)
1/2" EMT conduit
1/2" conduit straps
1/2" conduit fittings
Bell wire staples
2-single gang plastic and 3-single gang metal electrical boxes
1-Octagon electrical box mounted on adjustable sliding bar suitable for mounting of keyless lamp holder
Solderless connectors (wire nuts suitable for 14/2, 14/3 and door bell wire)
NM cable staples
NM cable connectors
Nails and/or drywall screws for box mounting

Power Source

Electrical power source – 100 AMP, 120/240 single phase service panel pre-mounted with 2 (two) 15 AMP breakers installed
One breaker is to be utilized for each job. If not available, 120 volt power source is suitable

Safety Equipment

Safety glasses
Appropriate safety clothing
Work shoes

Wall Frame

4' to 8' wall section or wiring booth

Tools

Electrician's pouch with appropriate trade tools
1/2" electrical metallic tubing (EMT) bender (kickers or offset makers are **not** allowed)
Voltage tester with continuity or multimeter (tester used is the discretion of the proctor)
Hacksaw or cutting tool
Conduit deburring tool
Hammer
Torpedo level
MC cable cutter
Optional tools such as cordless drills and screwdrivers **are** allowed

Wiring

14-2 MC cable
14-2 and 14-3 NM cable
Doorbell wire
#14 THHN in colors black, white, and green

Miscellaneous Supplies

The National Electric Code (NEC) code book, **current** edition
Pencils
Scrap paper

GENERAL DRAFTING AND DESIGN (5172)

JOB 1

Drafting table equipment with parallel bar or drafting machine
Lead
Lead-holders or mechanical pencil
Lead pointer (if using lead holders)
One triangle or straightedge
Drafting scale
Compass (Pencil)
Drafting Tape
Eraser

JOBS 2, 3, 4, 5, and 6

NOTE: Site must determine method of completion, manual or CAD, prior to test administration.

Manual Completion

Drafting table equipment with parallel bar or drafting machine
Lead
Lead-holders or mechanical pencil
Lead pointer (if using lead holders)
One 45° triangle
One 30/60° triangle
Drafting scale
Compass or circle template
Lettering guide
Drafting Tape
Eraser
Eraser shield
Irregular curve

CAD Completion

CAD system with printer/plotter

HEALTH ASSISTING (5173)

JOB 1

Hand washing
Sink with hot and cold running water
Antibacterial soap
Nail brush and/or orange/cuticle stick
Paper towels
Waste container

Apply/remove PPE's
Work surface (clean and flat)
Gowns, assorted sizes
Gloves, assorted sizes (clean)
Surgical masks, assorted types
Waste container
Laundry container

JOB 2

Patient record jacket with file label
Sticker labels for allergy, insurance, etc.
Pen (black, fine point)

JOB 3

Volunteer to act as patient (teenager or adult)
Worksheet (provided in Participant booklets)
Oral thermometer with sheath
Blood pressure cuff
Stethoscope
Balance scales with measuring staff
Watch or clock with second hand (accurate)

JOB 4

Bed
Wheelchair
Volunteer to act as patient (teenager or adult)
Non-skid foot covering for patient
Bath blankets – two
Gait belt

JOB 5

Hospital bed
Chair or bedside table
Pillow
Laundry hamper
Sink with running water and antibacterial soap
Set of linen for each participant (choice of either):
2 large sheets, 1 draw sheet (a folded sheet may be used), 1 pillow case, 1 spread
or 1 fitted sheet, 1 large sheet, 1 flat bed pad, 1 pillow case, 1 spread

INDUSTRIAL MAINTENANCE MECHANICS (5174)

GENERAL TOOLS/MATERIALS:
All necessary protective clothing and safety equipment

JOB 1
Air pressure source for pneumatic
Electric supply source 24 VDC regulated power source (minimum 5 amps DC supply)
1 - push button switch
1 - double-acting single throw selector switch (toggle switch) with a "bat" handle
2 – metal mounting boxes for above switches
2 – limit switches
3/8 inch air line, 8 feet
1 – 24 VDC control relay with 2 N.O. contacts
Green and red indicator lamps (24 VDC) with holders (sockets) with screw terminals
Phillips screwdriver
Flat head screwdriver
Utility knife
10 – 3/8 inch air line hose clamps
2 – flow control valves (full-flow one-way)
10 – 3/8 inch threaded barbed hose fittings
1 – double-acting pneumatic cylinder (1 inch x 6 inch) with 3/8 inch threaded ports
2/4 directional control valve (DCV) with one solenoid with 24 volt DC coil
20 feet – blue 16 gauge multi-strand wire (THHN) (+DC)
20 feet – white with blue stripe 16 gauge multi-strand wire (THHN) (-DC)
2 – wire nuts appropriate for 16 gauge wire
Plywood sheet (2 feet x 2 feet)
30 - #8 wood screws (1/2 inch long)

JOB 2
Work bench (or adequately sized work station)
1/2 horsepower variable speed electric motor, 110 volts
Flexible coupling appropriate size for motor
Clamp-on ammeter
8 – pillow block bearings, 5/8 inch
2 – shafts, cold rolled, 5/8 inch diameter x 12 inch length (keyed for .185 key stock)
2 – shafts, cold rolled, 5/8 inch diameter x 8 inch length (keyed for .185 key stock)
2 – spur gears, 12 diametrial pitch (DP) with 36 teeth

JOB 2 (continued)
1 – spur gear, 12 diametrial pitch (DP) with 48 teeth
1 – spur gear, 12 diametrial pitch (DP) with 24 teeth
Key stock, 2 feet, .185 inch
1 – prony brake
Bed plate (3 feet x 4 feet x 1/4 inch) – aluminum plate (slotted to 3/8 inch per print)
10 nuts and bolts – 5/16 inch – 18 UNC-2A x 2-1/2 inch
20 nuts and bolts – 5/16 inch – 18 UNC-2A x 4-1/2 inch
60 flat washers – 5/16 inch
30 lock washers – 5/16 inch
2 – wrenches – ½ inch
1 rubber mallet
Punch #3
1 – ballpeen hammer – 22 ounce
1 – dial indicator with magnetic base
Power source, 110 volt
Sheave gage
10 – Shims, sheet metal (.005)
10 – Shims, sheet metal (.010)
Straight edge ruler, 4 inch
Grease gun – filled
Level, 3 inch

JOB 3
Pencils
Blueprint and worksheet (provided in performance assessment booklet)

JOB 4
Grounded work bench (or adequately sized work station)
Rubber mat to stand on
Electric motor, 3-phase Y-connected (with a blown fuse from Line 1 to H1 on transformer)
Multimeter
Fuse (working) appropriate size for motor
Switch (working) appropriate size for motor
Starter relay (working) 3-phase, appropriate size for motor
Phillips screwdriver
Flat head screwdriver
Fuse pullers (appropriate sizes for each size fuse)

PLUMBING (5175)

JOB 1

NOTE: Leak testing on PVC pipe should be completed with minimum pressure (no more than 40 psig) due to time and safety.

Provide one set of the following tools/materials per workstation:

PVC saw and/or plastic pipe shear
Plastic reamer for 2" and 1-1/2" pipe
One 10' x 2" section of PVC pipe
One 5' x 1-1/2" section of PVC pipe
Tape measure or folding rule
4-in-1 screwdriver
Torpedo level
Twenty 1" drywall screws
Eight 2" x 4" nail plates
Four 6" x 6" nail plates
PVC cement
PVC purple or clear primer
(per facility preference)
Claw hammer
Slip-groove pliers
Safety glasses
Work gloves
One 1-1/2" PVC sanitary tee
One 2" x 1-1/2" PVC sanitary tee
One 2" x 1-1/2" PVC double sanitary tee
Two 1-1/2" PVC 90º elbows
One 2" x 1-1/2" PVC bushing
Two Fernco® 1-1/2" test caps
One Fernco® 2" test cap
Two 1-1/2" J-Hooks
One 2" Riser Clamp or J-Hook
Assorted dry rags
Carpenter's pencil
Copy of local plumbing code book

JOB 2

NOTE: Leak testing on CPVC pipe should be completed with minimum pressure (no more than 40 psig) due to time and safety.

30 lb. and 100 lb. x 1/4" test gauge assembly, preassembled with the following:

- 1/2" x 1/4" black malleable tee
- 1/2" threaded ball valve
- Two 1/2" x 4" black nipples
- One 1/4" Schrader valve (snifter)
- One 1/2" x 1/4" BCI bushing
- One 1-1/2" CPVC x 1/2" female bushing
- One 1-1/2" Fernco® coupling
- One 2" x 1-1/2" Fernco® coupling

Teflon® tape
One 1/2" x 20' CPVC pipe
Five 1/2" CPVC tees
Twelve 1/2" CPVC 90º ells
Four 1/2" CPVC 45 ells
Four 1/2" CPVC street 90º ells
Six 1/2" CPVC caps
One 1/2" CPVC female adaptor
CPVC Cement
CPVC Primer
Plastic CPVC pipe shear
Twenty 1" drywall screws
Torpedo level
4-in-1 screwdriver
Copy of local plumbing code book
Spray bottle with dish soap solution (if leak testing with air)
10" adjustable wrench
8" adjustable wrench
One slip-groove pliers
Eight 2" x 4" nail plates
Safety glasses
Work gloves
Two 27" adjustable water line supports
Carpenter's pencil
Pencil sharpener
Tape measure or folding rule
Pre-moistened hand wipes or shop towels
Broom and dustpan
Trash bags or refuse containers

PLUMBING (5175) continued

Shop Requirements:

- Air compressor with Schrader adaptor – proctor must adjust pressure
- 30-lb. or less preassembled test gauge, set-up
- 60-lb.or higher preassembled test gauge, set-up
- 12-gauge cord with a GFCI
- Appropriate number of copies of current adopted plumbing code book
- Appropriate fire extinguishers
- 5/16" nut driver
- 50' garden hose (optional)
- 2" Jim cap with boiler drain (optional)

Wall Construction (pre-constructed and drilled out prior to test--one for each work station)

- Two 2" x 6" x 12'
- Two 2" x 6" x 8'
- Twenty-four 16-Penny nails or twenty-four 2-1/2" coarse drywall screws

INSTRUCTIONS FOR DRILLING THE WALL CONSTRUCTION:

- Drill water distribution holes in the front portion of 2 x 6 studs to facilitate vertical drainage pipe passage. (Suggested hole size is 1-1/4".)

- Center water lines on 7" and 10" centers from the bottom of the sole plate as shown in the drawing on the next page.

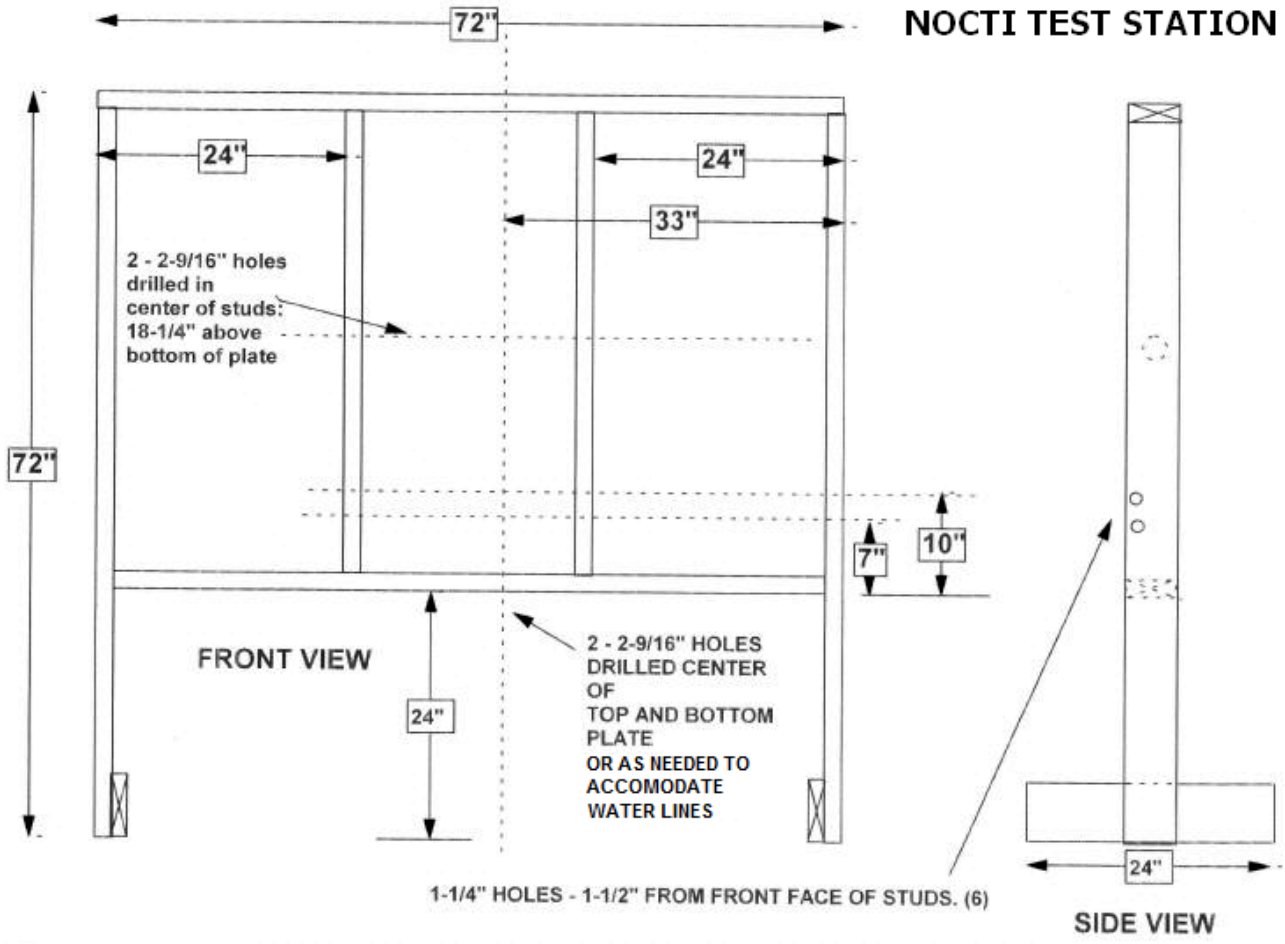
- Drill sole and top plate using 2-9/16" bit centered on 2 x 6, 33" over measuring from right side. Start measurement from the outside right of the stud wall.

- Drill two lavatory drainage holes 18-1/4" on center (from bottom of sole plate) in wall studs.

- Label to identify front and finished floor of workstation.

- Wall construction graphic is on the following page.

PLUMBING (5175) continued



PRECISION MACHINING (5176)

JOB 1

1/2 inch x 2 inch x 3 inch low carbon steel (cut from 1/2 inch x 2 inch flat stock)
Steel rule
0 to 1 inch depth micrometers
0 to 1 inch outside micrometers
1 to 2 inch outside micrometers
Vernier, dial, or digital calipers
Parallels
Dial indicator and attachments
Vertical milling machine
Abrasive shop cloth/Emory cloth
Adequate accessories (collets, chucks, swivel, or universal vise)
Selection of end mills, including one 3/8 inch and one under 3/8 inch
Mill file
Deburring tool
Cutting fluids
Cutting tools
Appropriate wrenches
Edge finder
Machinery's Handbook, or abbreviated version
Nonprogrammable calculator
Pencils/paper
Surface plate
Clean shop rags

JOB 2

Low carbon steel, 1.125 inch diameter x 6.62 inch (stock is to be pre-sawed, leaving enough material to face both ends)
Steel rule
0 to 1 inch outside micrometers
1 to 2 inch outside micrometers
Vernier, dial or digital calipers
Protractor with blade (from combination set)
Layout dye
Height gage
Thread micrometer
Engine lathe with live centers, aligned tailstock, and thread chasing dial
Chuck or collet
Drill chuck, key and sleeve for tailstock mounting
Dial indicator with stand
V-Block
Center drills (#3)
Standard tool holders
Tool bits for straight turning, shoulder turning and facing (HSS and WC)
Thread cutting tool holder and formed 60-degree thread tool
1/8 inch cut off tool and holder
Thread center gage (fishtail)
Threading compound
Screw pitch gage
Mill file
Cutting fluid
Appropriate wrenches (compound, Allen, Aloris)
Machinery's Handbook, or abbreviated version
Nonprogrammable calculator
Pencils and paper
Surface plate
Abrasive shop cloth/Emory cloth
Clean shop rags

SMALL ENGINE TECHNOLOGY (5177)

Engine, horizontal, four-stroke cycle, solid state type ignition (operable)
Engine service and repair manual
Workbench
Method for securing engine to bench
Engine stand
Disassembled engine (used) containing piston rings, crankshaft, coil, condenser, oil slinger, dipper, or pump, crankpin journal and cylinder
Engine, horizontal, four-stroke, with carburetor and fuel tank removed with service manual
Float-type carburetor with service manual (Walbro)
Diaphragm carburetor with service manual
0" - 1" micrometer
1" - 2" micrometer
2" - 3" micrometer
Dial caliper
Telescoping gauge, 2 1/8" to 3 9/16"
Continuity tester
Timing equipment
Tachometer, digital
Feeler gauge, flat
Feeler gauge, wire
Spark tester (appropriate type for each manufacturer)
Starter clutch wrench
Flywheel holder
Flywheel puller
Screwdriver, 1/4" blade
Screwdriver, 3/8" blade
Screwdriver, Phillips #1
Screwdriver, Phillips #2
3/8" drive socket set, 1/4" to 3/4" by 16ths
3/8" drive socket set, 1/4" to 3/4" by 16ths (deep)
Spark plug wrench, 13/16"
Spark plug wrench, 3/4" (deep)
Combination wrenches, box and open end, 3/8" to 3/4" by 16ths
Torque wrench
Valve spring compressor
Tools necessary to remove valves
Compression tester/leakdown tester
Non-magnetic feeler gauge
6" mechanic's scale - with 64ths
Gaskets and/or appropriate sealant
Spark plugs
Gasoline
Oil
Grease
Parts catalogs or electronic CD
Invoice blanks
Pencils
Shop towels

TECHNICAL DRAFTING (5178)

MANUAL

Drawing paper
Isometric grid paper
Orthographic grid paper
Scratch paper
30° - 60° triangle
45° - 90° triangle
Brush
Calculator
Circle template
Compass
Drafting machine or parallel bar
Drafting tape
Eraser
Erasing shield
Machinery's Handbook (or equal)
Pencils: 4H, 2H, H, and HB
Scale
Workstation

CAD

CAD software and documentation
Compatible printer/plotter with paper
Isometric grid paper
Orthographic grid paper
Scratch paper
Storage device (CDs, floppy disks, flash drive) if applicable
Machinery's Handbook (or equal)
CAD station

WELDING (5179)

The following list is recommended to be the minimum items necessary to test **ONE** participant. The evaluator may adjust the quantities, as needed, for the number of participants being tested. (*Multiple welding machine and booth redundancy is recommended to avoid delays due to equipment malfunction.)*

OXYFUEL CUTTING

1 Oxyacetylene cutting work stations with burning tables
1 Cutting tips for up to ¼ inch, up to ½ inch, and up to ¾ inch material thicknesses
2 Cutting outfits
2 Strikers
2 Tip cleaners

NOTE: An oxyfeul manifold system may be used by the participant. The evaluator must ensure that the manifold pipelines are pressurized prior to the participant testing.

SHIELDED METAL ARC WELDING

2 Welding booths with stools, welding tables, positioners and exhaust fans for ventilation
2 Welding machines: (DC rectifier type, 300 amp minimum ***or*** Combination AC/DC transformer-rectifier type, 300 amp
minimum **or** inverters, 250-300 amp range)
1 Electrode oven (for heating low hydrogen electrodes)

GAS METAL ARC WELDING

1 Constant voltage (GMAW) or inverter welding machine with a capacity of 280 to 300 amps; and a wire feeder set up for .035 inch or .045" steel filler wire, a minimum 75% Argon/25% CO_2 shielding gas mixture with appropriate combination regulator/flowmeter or manifold flowmeter.
2 Welding stations for GMAW with tables, positioners, exhaust ventilation and stools
2 GMAW gun component sets with consumables
5 GMAW contact tips (for each required wire diameter)
1 Anti-spatter compound (spray or dip)

NOTE: All welding machines, wire feeders, welding guns with nozzles and contact tips and necessary gas cylinder(s) (or manifold) must be set up and ready for the participant prior to testing. The participant is responsible for adjusting shielding gas flow rates and adjusting the machine settings.

GAS TUNGSTEN ARC WELDING

2 Welding booths with stools, welding positioners and exhaust fans for ventilation
2 Welding machines, combination AC/DC transformer-rectifier or inverter type set up for GTAW, using a minimum of 100% Argon shielding gas with appropriate regulator/flowmeter or manifold
2 Water-cooled 300-amp torches or air-cooled 200-amp torches connected to the power supply and operated by a remote
foot control or controlled by a stop-and-start contactor switch (optional)
2 GTAW torch component sets

NOTE: All welding machines, TIG torches, cables, hoses and shielding gas cylinder (or manifold) must be set up and ready for the participant prior to testing. The participant is responsible for machine settings, adjusting gas flow rate, selecting and installing TIG torch cup and preparing and installing the correct tungsten.

WELDING (5179) continued

Additional Apparatus

1 Large stationary vise
1 Power wire brush (portable or stationary)
1 Stationary grinder with two different grit wheels (fine and medium)
1 Portable power grinder with guard

Miscellaneous

(Adjust quantity as necessary for number of participants being tested)
Chipping hammer
Hand held wire brush (for cleaning during SMAW operatons)
Hand held stainless steel wire brush (for GTAW cleaning operations)
Vise grips/slip-joint pliers (various types)
C-Clamps (various sizes, 4" to 8")
12" Scale
Measure tape, 6'
Side cutting pliers
Soapstone
Ball peen hammers (various sizes)
Center punch
Set of number and letter steel marking stamps, ¼" size
Combination square, 12"
Scratch-awl (scribe)
Compass – wing dividers

Personal Safety Equipment

NOTE: Depending on the policy of the testing facility, the following safety equipment must either be provided by the testing facility for each participant *or* each participant must supply their own.

Welding helmet with shade 10-12 replacement clear cover lenses
Welder's gloves and protective leathers (full jacket or sleeves and apron)
Safety glasses or face shield, shade 3-5
Cutting goggles, shade 3-5
Ear plugs

Consumable Supplies

The following list is recommended to be the minimum items necessary to test ***ONE*** participant. The evaluator may adjust the quantities, as needed, for the number of participants being tested.

5 lbs. each Electrodes (SMAW), AWS E-7018, 1'8"

30 lb. spool Welding wire for GMAW, AWS ER-70S-X, .035" diameter (1 spool) ***or*** .045" diameter (1 spool)

2 lbs. each Welding filler rod for stainless steel, AWS Type ER308, 1/16" x 36", 3/32" x 36"

2 lbs. each Welding filler rod for aluminum, AWS Type ER4043 or ER5356, 1/16" x 36", 3/32" x 36"

1 pkg. each Tungsten Electrodes, AWS Types: EWP and EWTh-2, 1/16" x 7", 3/32" x 7"

The participant is expected to know the different types and diameters of electrodes. The AWS electrode number is specified on the job sheets where required.

WELDING (5179) continued

MATERIALS

Refer to the "Evaluator's Materials List" for a job-by-job materials list. The evaluator should provide scrap materials for each participant, similar to the materials used in each job, to allow the participant to make equipment adjustments.

EVALUATOR'S MATERIALS LIST

JOB #	TYPE OF MATERIAL	SIZE OF MATERIAL	EDGE PREPARATION	NUMBER REQUIRED	NUMBER OF PARTICIPANTS x No. Required = Total
1	Mild Steel Plate	1/2" x 6" x 6"	Square	1	
2	Mild Steel Plate	1/4" x 2" x 10"	Square	1	
2	Mild Steel Plate	3/8" x 3" x 7"	Bevel 22-1/2°	2	
3	Steel Tubing	3/16" x 4" x 4" x 2" Long	Square	1	
3	Mild Steel Plate	1/4" x 6" x 6"	Square	1	
4	Aluminum (Type 6061)	1/8" x 2" x 6"	Square	2	
5	Stainless Steel (Type 304 or 308)	1/8" x 1-1/2" x 6"	Square	2	